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ACQUISTION MODERNIZATION: TRANSITIONING TECHNOLOGY INTO WARFIGHTER CAPABILITY

by

Karl L. VanDenTop

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Advisor: Dr. Gregory F. Intoccia

Maxwell Air Force Base, Alabama

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ABSTRACT

The purpose of this paper is to analyze the rapid acquisition programs that have emerged to equip Warfighters in Iraq and Afghanistan with urgently needed capabilities to determine if these approaches can be institutionalized into the Defense acquisition system. The current acquisition system is not capable of effectively responding to the changing threats and rapid technological advancement in the modern security environment. This paper considers how the the DOD acquisition system can be modernized to facilitate the transition of weapon system technologies to better support the Warfighter. The acquisition approaches utilized by the Mine-Resistant, Ambush-Protected Task Force and the MQ-1C Gray Eagle UAS Quick Reaction Capability were compared against the standard practices of the acquisition system to determine potential solutions to accelerate major weapon system acquisitions.

The incompatibilities and fragmentation of the requirements, budgeting and acquisitions processes that comprise the basic structure of the acquisition system were found to be the major contributors to a self-induced cycle of instability. These issues can be corrected through a multidisciplinary acquisition approach that promotes integration and coordination of these interdependent processes. A specific budget authority should be created to fund technology maturation in the S&T Community. Technology demonstration events should be planned to facilitate interaction between technology developers and the Warfighter. Integrated Acquisition Teams should be established to concurrently leverage the expertise of the developer, acquirer, and Warfighter. These recommendations should result in a collaborative Defense acquisition system and culture that is capable of developing and delivering needed Warfighter capabilities on time and at cost.

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INTRODUCTION

The Department of Defense (DOD) acquisition system is a complex process that is no longer capable of assuring U.S. technological superiority on the battlefield. Excessive bureaucratic oversight and rigid stove-piped processes have delayed the transition of advanced technologies into the hands of the Warfighter. The inefficiencies of the acquisition system do not merely lead to extended schedules and cost overruns that burden the taxpayers. Delayed fielding of urgently needed technology can lead to "loss of life on the battlefield as soldiers wait for a solution to unanticipated threats."[1]

Despite persistent attempts to reform the system, The DOD acquisition system remains a relic of the Cold War era, when ten to fifteen year lead times before fielding major weapon systems was sufficient to remain competitive. The United States' global rivals at that time were confronted with similar bureaucratic impediments, enormous costs, and other constraints. [2] In contrast, agile and adaptable adversaries have emerged in the modern security environment. This generation of adversaries is unencumbered by strict acquisition regulations and procedures and can rapidly incorporate advanced technology from the global commercial marketplace into operational capabilities.[3]

Responding to these constantly evolving threats requires quickly and effectively transitioning technologies to the battlefield. Yet unfortunately, the DOD acquisition system was not designed to rapidly field technologies into the hands of the U.S. Warfighter. Failure to update the acquisition system with a more tailored and streamlined processes could result in a severe degradation of the U.S. technological advantage on the battlefield.[4] Such failure could mean that the U.S. Warfighter may be forced to fight a technologically superior adversary. It

could also prove to be disastrous to U.S. military personnel who have already carried a heavy burden in almost ten years of ongoing warfare.

The prospect of failing to sustain the key U.S. military technological superiority gives rise to the focus of this paper: How can the DOD acquisition system be modernized to facilitate the transition of technologies to better support the Warfighter? The DOD must modernize the acquisition system by focusing on three key areas: stabilizing the budgeting and funding process, encouraging interaction between technology developers and Warfighters, and implementing Integrated Acquisition Teams.

Specialized rapid acquisition programs like the Mine-Resistant, Ambush Protected Vehicles (MRAP) Task Force have proven that the system can be streamlined to respond to urgent operational needs. By circumventing the rigid policies and broadly mandated procedures of the current acquisition system, the MRAP program deployed 13,848 vehicles to Iraq and Afghanistan within two years to counter the growing threat of improvised explosive devices (IEDs).[5] Unanticipated Warfighter needs like these cannot afford years or decades of slow, deliberate progress through the defense acquisition system because Warfighter lives are on the line. While the MRAP Task Force did experience drawbacks regarding sustainment, the program provided valuable lessons that can be applied to accelerate the Defense acquisition system.

This research utilized the problem/solution methodology to analyze the policies, procedures, and regulations of the conventional acquisition system that inhibit timely technology transition. Rapid acquisition programs were then examined to determine potential solutions to accelerate the transition of technology to the Warfighter. Finally, recommendations were

developed to modernize the DOD acquisition system into a disciplined process that is capable of accelerating the transition of advanced technology into the hands of the Warfighter.

SECTION 2: BACKGROUND

The DOD Acquisition System is not a simple straightforward process for the methodical purchase of goods and services to support the military and other Defense agencies. The Acquisition System is an integrated system of systems designed to coordinate a broad spectrum of functions from the design, development, and testing of new technologies to the deployment and sustainment of weapon systems.[6] These activities encompass a complicated interconnected network of stakeholders and processes that must be effectively coordinated to ensure that the system is open, transparent, fair, and meets the technical needs of the government.

The acquisition system generates a broad range of products from commodities and services to information technology and aircraft. However, the scope of this paper focuses on the weapon systems subset of acquisitions because weapons systems have historically been the "marquee focus of Defense acquisition."[7] The processes, policies, and culture of the acquisition system are primarily structured for the development and fielding of major weapons systems.[8] Therefore, evaluation of acquisition programs designed to rapidly deploy weapon systems to the Warfighter should highlight the incompatibilities and inefficiencies of the overall acquisition system.

The operational environment faced by the Warfighter has changed significantly, but the acquisition system used to develop and deploy needed weapon systems and equipment has not changed.[9] The current threat environment features an enemy that can obtain commercial off-the-shelf technology that effectively undermines U.S. military operations.[10] In contrast, the Defense acquisition system is slowed by mandatory processes and excessive oversight that are

not suited to effectively respond to the dynamic warfare experienced in Iraq and Afghanistan.[11] The Defense acquisition system is not necessarily failing because the system has produced the finest military equipment in the world.[12] However, the processes of the system must be modernized and integrated to streamline the transition of new capabilities into the hands of the Warfighter.

The Defense Acquisition System

Three independent decision-support processes comprise the basic mechanisms of the acquisition system. Each process supports a primary function that is essential to the operation of the overall system. The Joint Capabilities Integration & Development System (JCIDS) determines requirements by identifying gaps in Warfighter capabilities and prioritizing technologies to resolve those gaps. The Planning, Programming, Budgeting, and Execution System (PPBE) allocates the financial resources to fund the development of technologies.[13] The Defense Acquisition System (DAS) manages the cost and schedule for the development, testing, and evaluation of the technology (Figure 1). The effective coordination of these interdependent processes is essential to efficient operation of the Defense acquisition system.

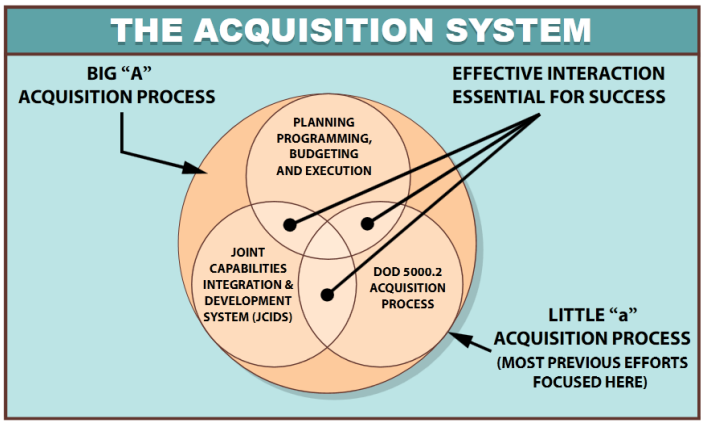

Figure 1: The DOD Acquisition System[14]

The configuration of the three acquisition processes is intended to ensure that program requirements have been properly vetted and costs are assessed against budgetary constraints. In theory, this should reduce technical risk and mitigate the potential for cost and schedule overruns. In reality, the coordination of the three main acquisition processes, JCIDS, PPBE, and DAS, is fundamentally flawed. The panel on Defense Acquisition Reform determined that "the complexity inherent in coordinating these robust and largely independent bureaucratic processes…is one of the primary challenges in Defense acquisition".[15] The Defense Acquisition Performance Assessment Report also concluded that the problems associated with the acquisition system are "deeply imbedded" in the primary decision-support processes.[16] The lack of effective coordination between these processes actually increases technical risk and drives cost and schedule growth.

Ineffective integration of the decision-support processes introduces additional technical risk into the acquisition system with the inclusion of immature technology. For example, the PPBE process determines what technologies will receive funding based on a rigid five-year cycle that is only open for revision every other year. This limited flexibility means that a when a requirement is identified by JCIDS there is often a two-year delay until funding for the corresponding technology can be inserted into the next budget.[17] As a result, JCIDS stakeholders often press for the inclusion of immature technologies into requirements because there may be a two-year wait for another opportunity to include the technology in the budget. In that time, the technology may become obsolete or may no longer be operationally relevant. The PPBE and JCIDS process timelines need to be coordinated to limit the insertion of immature technology.

The practice of inserting immature technical requirements is a common acquisition problem known as requirements creep. The Government Accountability Office (GAO) has

stated that requirements creep is one of the primary causes of the cost and schedule growth that is negatively impacting effective technology transition.[18] The 2010 Quadrennial Defense Review agreed by stating that the requirements for new technology are "too often set at the far limit of current technological boundaries."[19] Requirements creep is detrimental to the acquisition system because the inclusion of immature technology violates the basic structure of the acquisition system.

Technology maturity is the primary goal of the acquisition system. The deliberate procedures are necessary to minimize cost, schedule, and performance risk of the critical technologies that comprise weapon systems.[20] This ensures that fielded weapon systems are completely dependable and maintainable. The inclusion of undependable, immature technology on the battlefield can result in unexpected performance shortfalls during missions and reduced operationally availability. Mission failure or loss of life due to immature technology is simply not acceptable. Therefore, the acquisition system is structured to ensure technology is fully mature and reliable before operational fielding.

A linear, gated sequence is utilized to ensure technology maturity by separating the acquisition system into three distinct stages, Milestones A, B, and C. Milestone A encompasses the innovation and development functions performed by the Science and Technology (S&T) community. At this stage, scientists and engineers perform research and development (R&D) activities to develop advanced technologies. Milestone B epitomizes the traditional concept of the acquisition system where Program Mangers (PMs) are responsible for the product development function. At this stage, advanced technology is further developed into a deployable operational capability through extensive testing and evaluation (T&E). Milestone C designates the full-scale production and deployment of a capability that is considered to be reliable and

sustainable (Figure 2).[21] Technology maturity must be certified through independent reviews and formal reports before a technology is allowed to progress to the next Milestone.

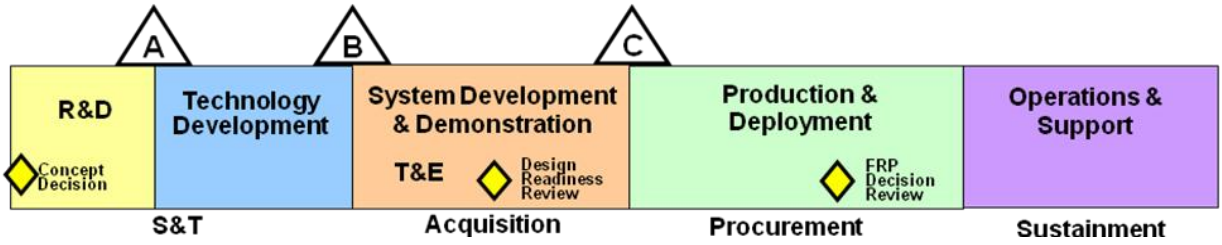

Figure 2: DOD 5000 Milestone Decision Process[22]

The specific requirements for the progression of a technology into Milestone A, B, or C are codified within a set of two companion documents known as the DOD 5000 series.[23] While the Federal Acquisition Regulations (FAR) and the Defense Federal Acquisition Regulations (DFARS) establish the overall rules that govern acquisitions, the 5000 series outlines the specific policies and procedures that are used within the DOD. DODI 5000.01 specifies that only the individual designated as the Milestone Decision Authority (MDA) has the authority to approve entry of a technology into the next milestone of the process.[24] DODI 5000.02 defines the criteria used to assess technology maturity at each Milestone.[25] The designated MDA must utilize these criteria to certify that a technology is mature before permitting entry into the next Milestone.

Technology Readiness Levels (TRLs)

In order to provide the MDAs with "a common vocabulary for discussing the maturity of the technology," the DOD utilizes the Technology Readiness Level (TRL) concept which was developed by the National Aeronautics and Space Administration (NASA).[26] The maturity of a technology is assessed on a numerical scale from 1 being the least mature emerging technology and 9 representing a fully mature technology that has been proven successful in operational fielding. Milestone A is associated with TRLs 1 through 5 encompassing the initial stages from

basic technology concept to validation of the technology. The DOD 5000 requirements for a technology to proceed to Milestone B are satisfied by TRL 6 representing successful demonstration in a relevant environment or TRL 7 demonstrations within an operational environment. Milestone C is associated with TRLs 8 and 9 which signifies that a technology is mature and ready to enter production and be deployed to the Warfighter (Figure 3). The TRL scale allows the diverse array of stakeholders within the DOD to share a common definition for the acceptable technology maturity level at each acquisition Milestone.

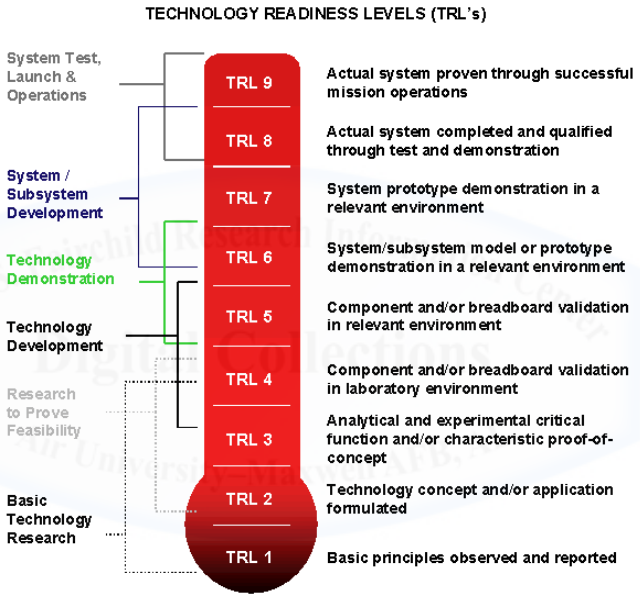

Figure 3: Technology Readiness Levels[27]

TRLs were useful as an informal metric to facilitate a common understanding of technology maturity for Defense acquisitions; but, bureaucracy would rise to negate the benefits of the TRL scale. In the 2006 Defense Authorization Act, Congress mandated that technologies must achieve certification at TRL 6, or higher, prior to Milestone B approval.[28] The TRL 6 requirement can be waived, but waivers are only granted in "extraordinary circumstances" where the ability to meet critical national security objectives would be obstructed.[29] The Congressional

mandate to utilize the TRL metric was intended as a standardizing tool that would control the rampant cost and schedule growth that had come to epitomize major Defense acquisitions. But, the additional bureaucratic oversight directly linking specific TRLs with specific acquisition Milestones resulted in further fragmentation the acquisition system.

The fractures primarily formed at the Milestone B seam which is the traditional dividing point between the S&T and Acquisition communities. This division epitomizes the cultural and motivational disconnect between the S&T and Acquisition communities. The S&T function is primarily concerned with developing new breakthrough technology. There is little consideration given to technology maturation or minimizing the cost and schedule impact of developing a deployable and sustainable follow-on capability.[30] In contrast, an Acquisition Program Manager is accountable for managing the cost and schedule needed to transform a technology into a reliable and maintainable capability. Technologies often fail to achieve Milestone B approval because S&T organizations lack the mission to sufficiently mature the technology and Program Managers are unwilling to accept the inherent cost and schedule risk associated with immature technology. The mandate for certifying technology at TRL 6 before entering Milestone B augmented this existing disconnect and further isolated the S&T and Acquisition communities.

The way that the two communities are funded best illustrates the lack of coordination between the two interdependent functions. The DOD finances the S&T and Acquisition functions with the Research, Development, Test and Evaluation (RDT&E) budget account. This funding covers a broad range of activities from basic research to testing and evaluation of complex weapons systems.[31] The RDT&E budget is divided into seven budget activities designated 6.1 through 6.7 to allow transparency and control over how these funds are allocated and spent. The individual budget activities are directly associated with a specific mission.

Funds are provided to accomplish that particular mission and should not be used for another purpose. For example, the S&T community is funded with the 6.1, 6.2, and 6.3 budget activities to accomplish the new technology development mission and mature a technology to TRL 5. At this stage, basic technological components can be demonstrated in a "simulated laboratory environment."[32] In comparison, TRL 6 requires a successful demonstration of the technology in a "relevant environment" which is a substantial escalation of the technology and "is well beyond TRL 5."[33] The Acquisition community is funded by the 6.4 through 6.7 budget activities to test and evaluate the technology and integrate the new capability into operational weapon systems (Figure 4). This funding model creates stove-pipes within stove-pipes which hinders effective integration within the acquisition system.

DOD RDT&E Budget Activities		
Community	Numerical Designation	Category
Science and Technology (S&T)	6.1	Basic research
	6.2	Applied research
	6.3	Advanced Technology Development
Acquisition	6.4	Demonstration and Validation
	6.5	Engineering and Manufacturing Development
	6.6	Management Support
	6.7	Operational Systems Development

Figure 4: DOD RDT&E Budget Activities[34]

The Acquisition Valley of Death

The mission and funding differences between the S&T and Acquisition communities serves as a formidable barrier to technology transition. The gap is informally known within the Defense acquisition workforce as the Acquisition Valley of Death (AVD) because this is where new technologies often languish and terminate before ever reaching the field. The seemingly minor misalignment between missions, TRLs, and the RDT&E funding model is a major

contributor to the valley of death. Technologies become obsolete on the shelves of S&T laboratories unable further mature the technology while acquisition PMs are not authorized to accept immature technology that has not been certified at TRL 6. The ultimate result of these incompatibilities is the formation of the Acquisition Valley of Death (Figure 5).

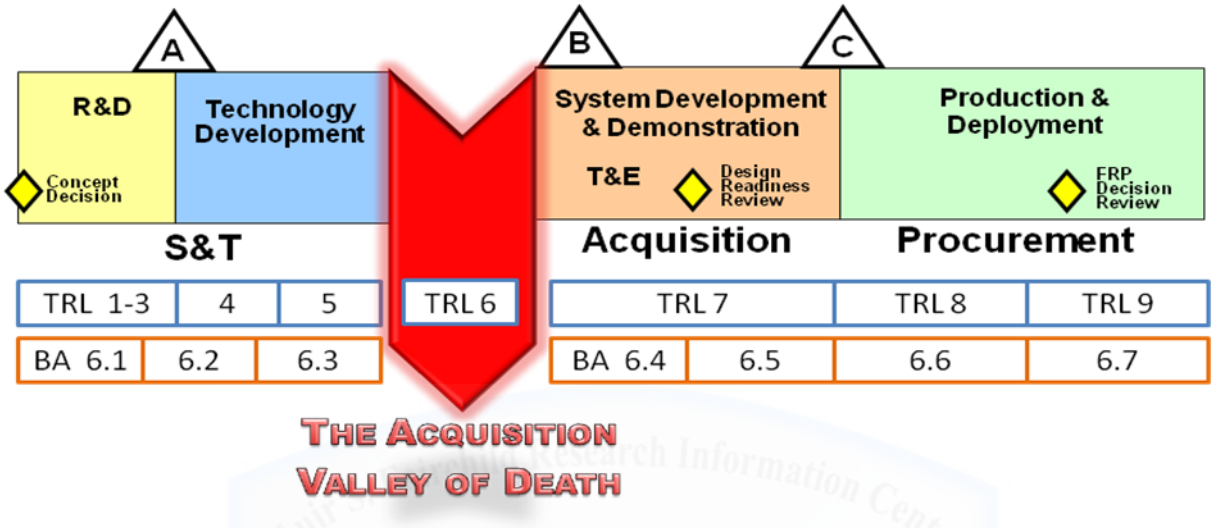

Figure 5: The Acquisition Valley of Death

The Defense acquisition system has been routinely criticized by various stakeholders for failing to meet Warfighter needs. The Under Secretary of Defense (AT&L) asserted that technology assessments and the TRL certification process "has grown well beyond the original intent and should be reoriented."[35] The GAO concluded that the "DOD's approach to funding technology development and transition is flawed" and recommended that a portion of the 6.4 budget activity should be set-aside for the S&T community to manage the transition of technology. [36] The oversight measures intended to control funding and eliminate immature technology have further fragmented the acquisition system. Critics often point to strict regulations and policies as the root cause of the problems attributed to the acquisition system. However, these control measures are merely the consequence of the lack of integration that permeates the entire system. The major obstacle preventing efficient technology transition to the

Warfighter is the lack of collaboration and coordination between the stakeholders and processes of the Defense acquisition system.

Brief History of Acquisition Reform

Attempts to improve the Defense Acquisition System through reform are not a recent phenomenon. In 1862, the U.S. House of Representatives Committee on Contracts issued a 1,100 page report on the mismanagement in Defense acquisitions which resulted in 'buying weapons that did not work, horses that were diseased, and food that was rotten".[37] More recent acquisition reform efforts can be traced to the passage of the Goldwater-Nichols Act in 1986. Although Goldwater-Nichols is considered as a major step forward for the military services, acquisition analysts maintain that the reforms ultimately failed to remedy the DOD's acquisition execution problems.[38] Despite the incremental improvements achieved by past reforms, the ability of the system to deliver weapons systems to the Warfighter on time and at cost has not improved in the past 20 years.[39] Widespread cost overruns and schedule delays continue to plague major DOD acquisitions to this day.

Congress has responded to the rampant cost and schedule growth by making legislative efforts to improve the system an annual exercise. Extensive reforms have been instituted within the past couple of years alone. The DOD 5000 Series instructions were significantly revised in 2008 to emphasize technical assessment reviews. The Weapons System Acquisition Reform Act of 2009 added more oversight for the acquisition of major weapons systems. The Implementing Management for Performance and Related Reforms to Obtain Value in Every (IMPROVE) Acquisition Act of 2010 focused on adding oversight to the acquisition programs that were not covered by the Weapons System Reform Act.[40] However, the majority of this recent acquisition

reform legislation has merely attempted to enhance oversight by increasing layers of oversight, bureaucracy, and reporting requirements.

Additional reporting requirements produce the unintended consequence of reducing the time and resources that acquisition professionals can dedicate to executing programs. "Programs advance in spite of the oversight process rather than because of it."[41] The DOD is presently responsible for generating approximately 719 congressionally mandated reports annually at a conservatively estimated cost of $350 million.[42] The amount of oversight built in the system led the Defense Acquisition Performance Assessment Panel to conclude that "the quantity of reviews has replaced quality, and the torturous review processes have obliterated clean lines of responsibility, authority, and accountability."[43] The oversight intended to control cost and schedule growth may actually contribute to the problems that interfere with the efficient operation of the system.

Even these recent acquisition reform efforts have thus far failed to resolve the root causes of cost growth and schedule delays. The DOD acquisition system is still a deliberate and ponderous process with an average lead time of approximately ten to fifteen years, or longer.[44] The 2010 Quadrennial Defense Review Report stated that the problems associated with the acquisition system "hamper our ability to acquire critical platforms in a timely manner and at acceptable cost."[45] The 2007 Defense authorization bill reported that "simply put, the DOD acquisition process is broken".[46] Proponents of the conventional acquisition system contend that the bureaucracy, oversight, and intricate review processes mitigates cost, schedule, and technical risk in the long-term. In contrast, the inabilities of the system to rapidly respond to warfighter needs compelled U.S. forces in Iraqi and Afghanistan to locally purchase and fabricate armored panels to protect vehicles from improvised explosive attacks (IED) attacks. [47] The U.S.

Warfighter is characterized by the ingenuity to overcome challenges and accomplish the mission. However, the bureaucratic and procedural impediments of the acquisition system should not be yet another obstacle that the Warfighter must strive to overcome. Taking 15 years to develop and deliver a new capability to the Warfighter is not an acceptable timeframe within the current security environment.

SECTION 3: POTENTIAL SOLUTIONS

The DOD acquisition system must be modernized to respond to changing threats and rapid technological advancement in the modern security environment. Operations in Iraq and Afghanistan have magnified the ineffectiveness of the Defense acquisition system to quickly respond to unanticipated threats and operational gaps. Rapid Acquisition Programs have emerged to circumvent or accelerate acquisition processes and equip the Warfighter with urgently needed technology. This paper compares the acquisition approaches utilized by these rapid acquisition programs against the standard practices of the acquisition system to determine potential solutions that could be applied to modernize the defense acquisition system.

Rapid Acquisition Programs

The deficiencies of the Defense acquisition system do not merely lead to cost and schedule growth. "Delays lead to loss of life on the battlefield as soldiers wait for a solution to unanticipated threats."[48] There are at least 31 Joint or Service specific entities that have emerged to rapidly transition technology to the Warfighter.[49] These are mainly small *ad hoc* programs that operate outside of the formal policies of the acquisition system to rapidly deliver technological innovations that save Warfighter lives. Most of these rapid acquisition programs are only authorized for a narrowly defined set of urgently needed capabilities to eliminate a gap that had resulted in combat fatalities or mission failure.[50] However, the mere existence of these

programs is a clear indicator of the lack of confidence in the ability of the acquisition system to effectively respond to Warfighter needs on the battlefield.

There is significant value in evaluating the structure and procedures of the programs utilized to rapidly field new capabilities in Iraq and Afghanistan. These rapid acquisition programs operate on a framework that is nearly identical to the structure of the acquisition system. The requirements, budgeting, and acquisitions processes all interact within in a condensed model that tracks a similar trajectory as the existing acquisition system (Figure 6). Therefore, the procedures utilized by rapid acquisition programs could be applied to streamline and accelerate the more deliberate acquisition system.

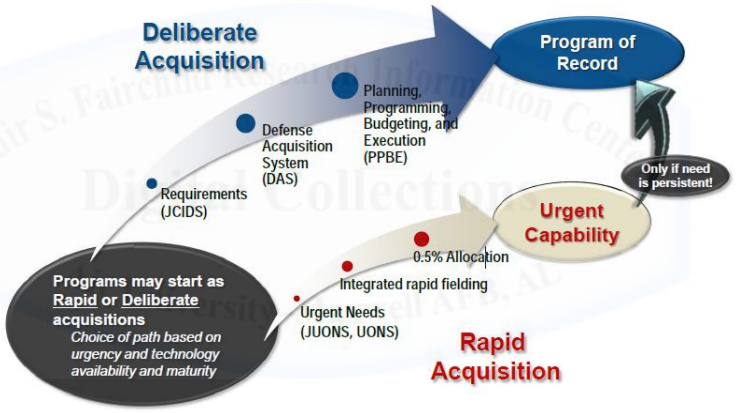

Figure 6: Deliberate and Rapid Acquisition Paths[51]

Evaluation focused on two rapid acquisition programs that were selected to provide insight into the processes that unreasonably impede technology transition as well as the processes that are necessary to ensure reliability and sustainability. The Mine-Resistant, Ambush Protected Vehicles (MRAPs) Task Force was selected to provide the perspective of rapidly fielding a capability needed to counter an unanticipated adversarial tactic. The Gray Eagle Unmanned Aircraft System (UAS) was selected to provide the perspective of utilizing an innovative acquisition approach to accelerate the fielding of a needed capability. These

programs present two distinct approaches towards technology transition that demonstrate both the benefits and limitations of rapid acquisitions.

Evaluation Criteria

The evaluation of the selected rapid acquisition programs was based on the three criteria: 1) Time to Field, 2) Sustainment, and 3) Transition to a Program of Record. Time to field analyzed the average lead time from requirement identification to a fielded operational capability. This criterion provided a baseline for direct comparison of rapid initiatives against similar programs progressing through the traditional acquisition system. Sustainment encompassed the ability to provide support to the Warfighter after the initial fielding of the capability. This criterion included training, maintenance, and reliable performance of the technology after initial fielding. Transition to Program of Record tracked the ability of a rapid acquisition program to institutionalize new capabilities into permanent budgets and organizational strategy. This set of evaluation criteria did not simply focus on reducing the time required to deploy a technology to the Warfighter, but also considered the follow-on effort necessary to sustain the capability after initial fielding.

Mine-Resistant, Ambush-Protected Vehicles (MRAPs) Task Force

The MRAP Task Force demonstrates what can be accomplished when the processes of the acquisition system are integrated to achieve a unified goal.[52] Technology transition barriers were eliminated by streamlining and synchronizing the requirements, budgeting, and acquisition processes to rapidly field the urgently needed vehicles. The procedures employed by the task force inform both the benefits of rapid fielding as well as the long-term sustainment drawbacks associated with compressed testing schedules. The lessons learned from the MRAP Task Force

provide essential insight into how early end user feedback and effective coordination can streamline major weapon systems acquisitions.

Requirements

The MRAP Task Force was stood up to rapidly counter the growing threat of Improvised Explosive Devices (IEDs) in Iraq with a vehicle that provided enhanced survivability in the event of an attack. Requirements were handled through the Joint Urgent Operational Needs (JUONS) process which is a rapid alternative to the standard JCIDS requirements process. The JUONS process was formalized in 2005 when the Joint Chiefs of Staff recognized that the acquisition system could not fulfill the urgent needs of operations in Iraq and Afghanistan. JUONS are limited to technologies that are urgently needed to eliminate a capability gap that resulted loss of life and/or mission failure and were outside the scope of existing processes.[53] The JUONS process allowed Combatant Commanders to identify the capability gap and quickly approve the requirement for the acquisition of MRAP vehicles.

The MRAP program focused on only providing the simple requirements that were identified by the Combatant Commanders to stay on schedule and within budget. The GAO stated that the timely fielding of the vehicles was primarily because the requirements were kept "simple, clear, and flexible" and the DOD did not "dictate a single acceptable solution."[54] The Task Force maintained the discipline to provide the Warfighter with only the minimum requirements needed and avoided requirements creep that typically results in cost and schedule growth. Requirements were solidified early in the process because the Warfighter was involved at the onset of the program. Feedback was received directly from the operational end user throughout entire cycle of the program. This should become a standard practice for all major programs in the acquisition system.[55] Technical, cost, and schedule risk can all be minimized

when the Warfighter becomes involved early in the acquisition process because technology development can be directly associated with operational needs.

Budgeting

The budgeting process was not an issue for the MRAP Task Force because supplemental wartime appropriations were utilized to fund the program. The MRAP did not have to be inserted into a Service budget because the vehicle would not be funded with annual appropriations. The Task Force was able to circumvent the PPBE process and immediately align the MRAP requirement with a stable funding source. The Secretary of Defense gave the program a DX rating, the highest possible priority for a DOD acquisition, and allocated "nearly unlimited funding" to rapidly field the urgent need.[56] This funding was not limited by the restrictions of RDT&E budget activity designations which permitted the Task Force the discretion to apply MRAP funding as needed throughout the development process. The MRAP budget situation was unique and could not be replicated for every weapon system acquisition. But, the process provides a precedent for applying unrestricted funding to technology development.

Acquisition

The MRAP Task Force also succeeded by consolidating the technology development and product development stages into a single comprehensive phase. The segregation of technology development in the S&T community and product development in the Acquisition community creates bureaucratic transition barriers. The MRAP vehicle was not designated as an acquisition program of record and was not restricted by the mandatory reviews of the rigid Milestone decision process. Therefore, the MRAP did not need to be assessed and rated on the TRL scale for technology maturity before proceeding to subsequent stages of the acquisition. The Task

Force utilized this freedom to integrate technology developers, acquisition personnel, and Warfighters within a tailored developmental process which consisted of four phases of concurrent development, testing, and evaluation with a high degree of overlap (Figure 7).

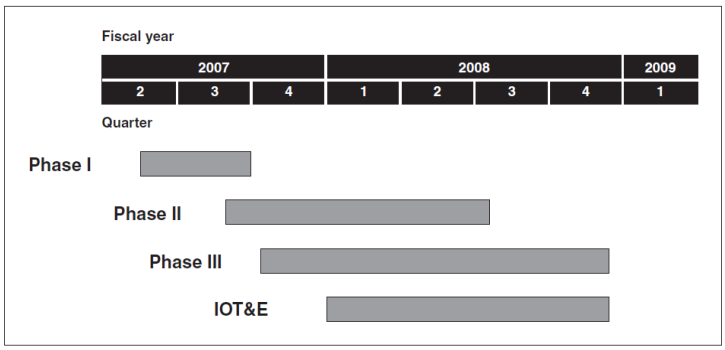

Figure 7: MRAP Developmental and Operational Test Plan[57]

The MRAP acquisition approach consisted of a limited user test in Phase I that got the vehicles in the hands of the Warfighter as soon as possible and provided immediate feedback to the design and production teams.[58] The subsequent ballistic protection, automotive endurance, and initial operability testing were conducted nearly in parallel.[59] The MRAPs were being developed and tested as the first vehicles were rolling off the production lines. This allowed for continuous improvement to testing and production and permitted Combatant Commanders to issue follow-on orders for additional vehicles.[60] This tailored approach allowed the technology developer, acquirer, and Warfighter to interact and collaborate throughout the entire development of the MRAP vehicle.

Evaluation Criteria: Time to Field

The effective integration of the requirements, budgeting, and acquisition process enabled the fielding of the MRAPs in a fraction of the time required for a typical major vehicle acquisition. Accelerating the deployment of MRAP vehicles to theater was a concerted political and industrial effort on a scale that has not been experienced since World War II.[61] The GAO

reported that initial operational capability for the MRAP was accomplished in 33 months after the Warfighter need was identified.[62] However, this timeframe does not account for the two-year political deliberation before the vehicle was officially approved as a requirement. As of July 2009, about two years after final requirement approval, 13,848 MRAP vehicles had been fielded in Iraq and Afghanistan.[63] The all-terrain version of the MRAP began development in 2009 and more than 5,700 of those vehicles had been delivered to Afghanistan by August 2010.[64] In contrast, the Army's new Ground Combat Vehicle is expected to roll out the first production vehicle in about ten years using standard acquisition procedures.[65] A ten-year delay for the next generation of ground vehicles is inadequate when the MRAP Task Force demonstrated that a major vehicle capability can be delivered to the Warfighter within a two-year timeframe.

Evaluation Criteria: Sustainment

Accelerating the delivery of the MRAP vehicles to the battlefield did involve significant trade-offs in the area of sustainability. Sustainment refers to the reliability and maintainability of the technology to ensure that the operational capability is available when and where needed. The deliberate testing and evaluation phase of a major acquisition takes years to achieve deployment, but the process is designed to reduce sustainment costs by enhancing the dependability and usability of fielded systems. Compressed testing and evaluation schedules offer limited opportunity to minimize the long-term operating and sustainment costs which typically account for 70% of the total costs for a program.[66] The immediate need to counter the IED threat by rapidly fielding operational and survivable MRAP vehicles overrode the need to optimize reliability and maintainability over long-term sustainment.

A wide array of limitations adversely affected the MRAP vehicles as a result of the expedited and concurrent development and testing process. Poor off-road performance, high fuel

consumption (three miles per gallon), and the sheer size of the vehicle has reduced maneuverability and usability in the mountainous terrain of Afghanistan.[67] These issues would have likely been resolved or mitigated in the deliberate test and evaluation phase of the acquisition system. The Task Force was able to correct some of these limitations in the development of the follow-on all-terrain versions of the vehicle. But, there are reportedly more than 5,000 of the original MRAP vehicles deployed in Afghanistan that are not used due to the size and mobility limitations.[68]

Evaluation Criteria: Transition to a Program of Record

The operational limitations and sustainment issues of the MRAP have hindered the transition of the vehicle into an acquisition program of record. Supplemental appropriations were used to develop and field the vehicle, but the long-term maintenance costs of the MRAPs will need to shift to the baseline budgets of the Services. Each Service is still deciding how to fit the cumbersome vehicles into long-term budget strategies and inventories.[69] Officials are reluctant sacrifice the development of their own next-generation vehicle platform for MRAP vehicles with flawed operational capability. The Joint Light Tactical Vehicle (JLTV) program of record has actually been delayed by the MRAP. The Army introduced requirements to add similar crew protection as the MRAP to the performance requirements of the JLTV. This example of requirements creep is expected to extend the JLTV development schedule by two years.[70] The MRAP Task Force delivered an imperfect solution that undoubtedly saved lives in the field, but the end product was ultimately flawed and could not be transitioned into a program of record without substantial modification.

MRAP Evaluation Summary

The MRAP Task Force illustrates several key practices that inform the need to better integrate the stakeholders and processes of the acquisition system. Early end user involvement was essential to determining a set of simple performance requirements that were absolutely needed by the Warfighter. The tailored development and testing phase also focused on getting the technology into the hands of the Warfighter to elicit feedback early in the process. Direct interaction between the Warfighter and the technology developer is a concept that should be broadly applied to the acquisition system.

The limitations of the approach also offer significant insight into the aspects of the acquisition system that add value to the process. Expediting the test and evaluation process resulted in long-term sustainment and operational issues after the capability was deployed. These issues have deterred the Services from pursuing the MRAP as a program of record. Budgets have also been complicated with the need to continue support for the MRAP vehicles while also pursuing development next-generation platforms. Despite the drawbacks, the MRAP solution has proven that even a large-scale and typically long-term major vehicle acquisition can be rapidly transitioned to the Warfighter.

MQ-1C Gray Eagle Unmanned Aircraft System (UAS)

While the MRAP program conflicted with programs of the record, the MQ-1C Gray Eagle Unmanned Aircraft System (UAS) was intended to complement and accelerate an existing program of record. A hybrid Quick Reaction Capability (QRC) process was utilized to rapidly field a limited number of prototype UAS systems based on the Army's Sky Warrior program of record. The QRC process is a significant departure from the linear, gated process of the acquisition system. The QRC concept simultaneously delivers advanced technology to the

battlefield while the capabilities for the formal program of record are still being refined.[71] This approach represents a complete nonconformity with the technology maturity requirements that prevent emerging technologies from reaching the Warfighter. The acquisition system eliminates the end user from the process until technology development is deemed to be complete and ready for deployment. The QRC process inserts the end user directly into the technology development progression. The urgent needs of the warfighter are met and the battlefield experience is used to enhance the capabilities of the full-production version of the technology.

The dual objectives of the QRC strategy to meet both near-term and long-term needs are complicated and require continuous coordination throughout the entire acquisition system.[72] The QRC focused on stakeholder integration by establishing a cross-functional team consisting of Warfighters and technology developers. Removing the artificial barriers between these stakeholders enables close synchronization that is highly beneficial during technology development. Similar to the MRAP Task Force, direct interaction between stakeholders enabled the QRC to set tightly scoped requirements and tailor testing and evaluation to accelerate the fielding of needed technologies.[73]

Requirements

The initial requirement for the UAS was the result of a directive from the Secretary of Defense to increase the Intelligence, Surveillance, and Reconnaissance (ISR) capabilities in Iraq and Afghanistan.[74] Army leadership decided to respond by fast tracking two prototype versions of the existing Sky Warrior UAS program of record using the QRC procedures. The prototypes were named Gray Eagles and the Army quickly set to work determining which specific capabilities were urgently needed by the Warfighter. Rather than rely on a board of officials like the JCIDS process, the Gray Eagle program inserted the end user directly into the acquisition.

The Warfighter was able to provide feedback directly to the technology developer and specifically identify the capabilities which were immediately needed. This teamwork advised that the first prototype UAS would only include the immediately needed ISR capability. An additional year would be needed to produce a second version to included Hellfire missiles and upgraded satellite communications.[75] The inclusion of the Warfighter permitted the developers to produce only what was urgently needed and incorporate additional capabilities in subsequent Gray Eagle versions.

Budgeting

Early and frequent collaboration on requirements also facilitates stability in the budgeting process. Development cost and schedule risk is mitigated because the developer better understands the Warfighter's needs. The Gray Eagle QRC is funded by the annual appropriations allocated to the program of record and the budget needed to be controlled to minimize the impact on the program of record. Program officials admit that there has been some cost and schedule growth associated with the need to rapidly deploy QRC systems to the Warfighter, but the increased cost is largely attributable to an increase in quantity requested from four to eleven systems.[76] The prototype systems are assuming the technical risk for the program of record to identify critical technology issues before deployment of the full-production UAS. The long-term cost impact to the program of record is not yet fully known and getting the systems into the hands of the warfighter may still prove to significantly reduce the cost and schedule for the ongoing program.

Acquisition

The Gray Eagle QRC also utilized early Warfighter involvement to compress the testing and evaluation process. Technology validation testing was combined with operator training into

a single phase that utilized simulated battle scenarios.[77] This enabled the test and evaluation cycle of the program of record to completely overlap with the training and deployment phase of the QRC effort. The concurrent testing and training was accomplished over an eight-month period with soldiers from E Company, Unmanned Aircraft Systems Training Battalion (UASTB) at Fort Huachuca.[78] The soldiers then deployed to Iraq with the initial version of the Gray Eagle prototypes. The deployed unit continuously communicated with the technology developers to provide insights into the improvements needed for the full-rate production of the program of record UAS.[79] This allowed the end user to evaluate system hardware and software capabilities literally on the fly in the battlefield environment. The Warfighter can have significant impact on the capabilities of the program of record while simultaneously supporting combat operations.

Evaluation Criteria: Time to Field

The QRC process was effectively utilized to integrate the fragmented acquisition processes and stakeholders to expedite fielding of a needed UAS capability. The first version of the Gray Eagle UAS was fielded within 18 months of being designated as a QRC and the second version with Hellfire missiles was deployed to Afghanistan about a year later.[80] In comparison, the Navy's Broad Area Maritime Surveillance UAS has an expected development time of approximately seven years.[81] The QRC prototypes have been fielded about one-and-a-half years in advance of the expected initial operational capability for the program of record. The fielded units have successfully flown more than 5,000 hours of combat missions that would not have been possible without the Gray Eagle UAS Quick Reaction Capability.[82]

Evaluation Criteria: Sustainment

Sustainment costs are a major aspect of the total program cost because the Gray Eagle system consists of much more than just a single unmanned aircraft. Each Gray Eagle UAS

encompasses: four unmanned aircraft, two ground control stations, 17 military personnel, and 29 contractor field representatives.[83] The inclusion of several immature technologies in the Gray Eagle UAS has led to reliability problems and increased sustainment costs. Specifically, the automatic takeoff and landing technology included on the UAS was not proven reliable in validation testing. Each of the prototypes that were fielded had to be deployed with two ground control stations. The new automatic control station was supplemented by a legacy Predator stick-and-rudder ground control station as a back-up in the event that the automatic landing capability failed.[84] The GAO reported that three out of the four Gray Eagle critical technologies are still considered immature and the Army has acknowledge that operational availability and reliability is a performance risk.[85] In contrast, the increased demand for more Gray Eagles in theater verifies that the new UAS is a needed Warfighter capability despite the performance shortfalls associated with limited testing and evaluation.[86]

Evaluation Criteria: Transition to Program of Record

The QRC concept is intended to complement the existing program of record, but the funding and resources necessary to accelerate the fielding of the Gray Eagle systems has been detrimental to the program. Cost and schedule growth has been directly attributed to the expedited fielding of the QRC systems. The planned initial operating capability for the full-production system has been pushed out by four years and is not expected to be delivered until 2013.[87] The GAO reports that the total program cost growth of 138 percent and could be driven higher as other needed technologies are identified by the deployed teams and become integrated into the final UAS version.[88] For these reasons, the QRC process could be perceived as yet another contributor to the cost growth and schedule impacts on established programs of record.[89] But, the reports on cost and schedule impacts make no mention of the lives saved and the

mission successes achieved because the advanced technology was rapidly fielded into the hands of the Warfighter.

MQ-1C Gray Eagle UAS and MRAP Evaluation Summary

The teamwork involved in Gray Eagle QRC and MRAP programs informs the need for developers, acquirers, and end users to work together within the acquisition system to achieve successful technology transition.[90] As supplemental wartime appropriations diminish, the funding for innovative rapid acquisition programs will come to an end. The "attempted paradigm shift" initiated by these rapid acquisitions will be "paralyzed" by the resurgence traditional bureaucracy.[91] Failure to apply the lessons learned from the successes and limitations of these rapid acquisitions programs could result in an acquisition system that is unable to maintain U.S. technological superiority against future adversaries.

SECTION 3: RECOMMENDATIONS

The DOD must take action to incorporate the lessons gained from rapid acquisition programs and institutionalize the ability to rapidly field new capabilities to the Warfighter within the existing acquisition system. Artificial procedural barriers that unnecessarily fragment the acquisition processes and separate the technology developers from the Warfighter must be eliminated. The mentality of servicing procedures, processes, and programs must be replaced by a culture of providing exceptional value to the Warfighter and the American taxpayer. The Defense acquisition system must be modernized through a multidisciplinary approach that is focused on integration and collaboration.

Enhance collaboration through better integration of acquisition processes. Focusing on the isolated problems within the individual requirements, budgeting, and acquisition processes is insufficient to achieve enduring improvements to the acquisition system. An overarching

approach must be utilized to encourage the interaction of stakeholders and effectively integrate these processes within the broader systemic context.[92] Stakeholders must understand that decisions and actions within an individual process can produce unintended consequences which propagate instability throughout the entire system. The stove-piped acquisition system must become a truly integrated system of systems that facilitates effective communication and collaboration between stakeholders.

Acquisition modernization should focus on the early stages of technology development. Previous acquisition reform efforts have predominantly focused on additional oversight and reporting requirements after Milestone B approval.[93] However, evaluation of rapid acquisition programs has shown that accelerating the testing and evaluation process at this stage can be exceptionally detrimental to long-term sustainment. Modernization efforts must engage the front-end of the acquisition system to achieve meaningful and enduring change. Strengthening the technology development stage of the system would produce mature technologies that require shorter test and evaluation cycles. Acquisition cost, schedule, and performance risk can be mitigated by shifting technical risk to the S&T community. This can be accomplished by stabilizing budgeting and funding, facilitating technology developer and Warfighter interaction, and implementing Integrated Acquisition Teams.

Stabilize Budgeting and Funding

Stabilize funding to break the acquisition instability cycle which produces cost and schedule growth. Budgeting and funding instability were identified by respondents to the Defense Acquisition Performance Assessment survey as one of the top specific problems with the Defense acquisition system.[94] Funding cuts, delays, and adjustments directly impact the stability of the acquisition system.[95] Program Managers are forced to continually extend

schedules and modify the scope of requirements to account for funding slippages. These unanticipated changes drive cost growths which causes funding to be diverted to cover the overruns. [96] Repeated failure to meet expected cost and schedule goals causes Congress to lose confidence in the system and apply additional oversight. Increased reviews and reports are mandated and the scope of the program is adjusted which can significantly lengthen schedules and add costs.[97] The end result is a perpetual cycle of self-induced instability that produces 15 to 20 year technology development schedules and substantial cost growth for major weapon systems (Figure 8).

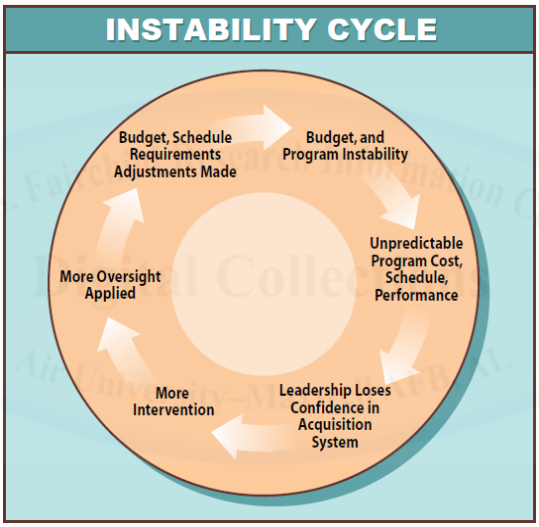

Figure 8: The Acquisition Instability Cycle[98]

Establish a stable funding source specifically for technology transition to reduce competition and encourage collaboration. The competition for increasingly constrained resources within this acquisition instability cycle fosters the stove-piped cultural mentality where collaboration is constrained. Each stakeholder is focused on securing the resources needed for their individual program to survive. Program Managers are unwilling to assume the cost and schedule risks associated with immature technology because the program may lose favor with

leadership and funding may be reduced or eliminated. This risk aversion hinders technology transition because there is no current funding mechanism for the development of promising immature technologies to the appropriate TRL maturity level.[99] Rapid acquisition programs are able secure the funding to mature technologies that are immediately needed to save Warfighter's lives. But, there is no equivalent funding source that is specifically identified for technology maturation and transition in the acquisition system. The lack of funding specifically identified for technology transition places undue reliance on supplemental war time appropriations and *ad hoc* organizations to accomplish the transition mission. The mission and funding to mature and transition technology must become a standard practice that is incorporated into the basic funding model of the acquisition system.

Create an individual budget account to fund the development of promising technologies. The Acquisition Valley of Death is littered with technologies that are stranded in the gap between the S&T and Acquisition missions and budget authorities. The proposed budget account would sustain the development of a maturing technology until the next PPBE budget cycle is again open for revision. This would allow the Services additional evaluation time to determine to determine if the technology should be included in the baseline budget. In 2006, the GAO made a similar recommendation that the DOD should allocate the existing 6.4 RDT&E budget activity to the S&T community for technology maturation and transition.[100] The DOD did not agree with the recommendation because that would detract from the S&T community's primary mission of creating, inventing, and discovering disruptive technology. However, a stable annual appropriation would allow S&T organizations to staff and plan for conducting technology maturation and transition. An annual appropriation would also allow leadership to specifically define the technology transition role and enable visibility into the process.

Realign the RDT&E funding model to mature technologies within the S&T community. Funding the S&T community to further mature technologies would shorten subsequent acquisition timelines and reduce major weapon system costs. The GAO found that Defense acquisition programs with immature technologies carry significant technical risk which drives cost and schedule growth.[101] In contrast, high-performing commercial companies were found to solve these technical risks within the S&T environment.[102] The S&T community offers the greatest risk reduction opportunities to stabilize requirements and budgets at the early stages of an acquisition. This enables the costs and schedule of the subsequent product development to be forecast with greater confidence and should alleviate some of the issues that perpetuate the budget and funding instability cycle.[103]

Enhance Interaction between Technology Developer and Warfighter

Ensure technology development corresponds with Warfighter needs. Investing in technology maturation at the S&T level expands the base of proven technologies that are available to both Program Managers and the Warfighter. But, efforts must be made to ensure that S&T resources are spent on the maturation of operationally relevant technologies. The benefits of shifting technology maturation to the S&T community are nullified if the technology is not directly linked with specific operational requirements and Warfighter capability gaps. This will require significant interaction between technology developers and the Warfighter. Essential requirements will need to be accurately identified to ensure that the technology satisfies mission needs.

Directly coordinate technology requirements with the Warfighter. Rapid acquisition programs have demonstrated the value of close coordination and continuous dialogue between the developer, acquirer, and end user.[104] Getting technologies into the hands of the Warfighter

early in the process can dramatically decrease instability later in the process. "There is no better or demanding laboratory than combat. What is learned there can inform requirements and capabilities development better than any prolonged academic study or voluminous requirements document."[105] The requirements creep problem, which greatly contributes to acquisition cost and schedule growth, can be avoided by setting stable minimum requirements that have already been coordinated with the Warfighter. Development schedules can also be drastically shortened by early involvement of the end user. The amount of time required to understand the needs of the operator is one the reasons that the normal acquisition timelines are so long.[106]

Facilitate increased interaction between the technology developer and the Warfighter. Despite the inherent value of early collaboration between technology developers and warfighters, direct interaction between the Warfighter and technology developer is not a standard practice of the acquisition system. There are relatively few mechanisms within the DOD to facilitate this connection. Advanced Concept Technology Demonstrations (ACTDs) are an example where prototypes of mature technologies are provided to end user to assess for immediate military usefulness and recommend upgrades and enhancements for further development.[107] The Joint Expeditionary Force Exercise (JEFX) is a series of large-scale live experiments based on an annual theme where end users can test the combat application of emerging technologies.[108] These events offer excellent interaction between technology developers and warfighters. But, substantial S&T resources have already been spent to develop the technology to the point of prototype demonstration. The DOD should plan and execute numerous events like these early and often in the technology development process.[109]

Establish specialized task forces to capture the invaluable lessons obtained on the battlefield. The DOD should implement an approach that leverages the hard won experience of

the Warfighter on the battlefield. Specialized task forces would provide the unique insight necessary to focus technology development on providing relevant capabilities to the Warfighter. These task forces should be formed of warriors returning home to act as advisors for DOD laboratories and provide input on initial technology planning. This would allow the Warfighter the opportunity to provide constructive input early in the process and transform innovative ideas into practical operational capabilities. The proposed task forces would also consult on prototype technologies that are ready for limited fielding through simulated battlefield exercises. These exercises would allow the Warfighter to operate the technology within realistic scenarios and enable feedback on the relevant application of the capability. The Warfighter could inform potential issues on the battlefield like mechanisms clogging with sand or other details that may not be considered in a laboratory environment. Enhanced end user involvement would better leverage the dollars invested in the S&T community and also relieve the instability afflicting the acquisition system by solidifying Warfighter requirements early in the acquisition process.

Implement Integrated Acquisition Teams

Provide adequate training and manpower for the acquisition workforce. Ensuring that acquisition professionals have the proper resources and adequate training is just as important as any improvement to the structure and procedures of the acquisition system.[110] Acquisition professionals have been burdened with an excessive workload in recent years because the size of the workforce not kept pace with increasing demand. Contractual obligations executed by the workforce have tripled while the amount of acquisitions professionals employed by the DOD actually dropped by ten percent over the past ten years.[111] The lack of sufficient manpower is magnified by the sheer volume of rules, regulations, policies and the "political tentacles" that are constantly changing the rules and processes.[112] Without the proper force of professionals with

the knowledge and authority to enforce regulations, the acquisition system will continue to operate at the current speed no matter how many legislative mandates are enacted.

Form Integrated Acquisition Teams consisting of multiple functional disciplines. Simply hiring additional personnel will not completely remedy the acquisition system issues. The evaluation of rapid acquisition programs revealed that the best results are achieved when acquisition professionals are closely coordinated with both technology developers and the Warfighter.[113] The DOD should structure the acquisition workforce to implement the utilization of Integrated Acquisition Teams consisting of individuals from multiple functional disciplines to provide knowledge and expertise throughout the system. This approach would leverage the proficiency of the acquisition professional in the regulatory environment, the expertise of the developer in the laboratory environment, and the experience of the Warfighter on the battlefield. The acquisition system could be dramatically streamlined if the unique aptitudes of each these disparate career fields were applied from the the onset of a program through operational fielding. These Integrated Acquisition Teams would effectively eliminate the structural and procedural barriers that fragment the entire acquisition system into separate stove-piped processes and therefore enhance integration and coordination.

Directly link program achievement with individual effort. The Integrated Acquisition Team approach would also permit dedicated teams of qualified, innovative professionals, who are willing to accept both the empowerment and accountability, to directly associate their individual effort with a major Defense program.[114] Aside from Program Managers, the majority of the acquisition workforce is not able to directly tie their daily effort to the success or failure of a single program. Therefore, acquisition professionals are not motivated to achieve

programmatic success or challenge bureaucratic policies to rapidly field a capability to the Warfighter.

Change the acquisition culture from procedural to innovative. The culture of the acquisition workforce is characterized by being "rewarded for following complex procedures with accuracy and precision."[115] Pursuing the waivers to circumvent regulations is countercultural to the risk adverse ethos that has been deeply imbedded into the acquisition system to control fraud, waste, and abuse. However, the DODI 5000.02 instructions for the acquisition workforce specifically states that individuals may "exercise discretion and prudent business judgment to structure a tailored, responsive, and innovative program."[116] These instructions were specifically revised in 2008 to encourage this type of flexibility. The preference for adaptable and responsive acquisitions is a fairly recent shift away from the rigid and stringent directives of the past. The DOD should conduct in-depth training on the availability of waivers and endorse a cultural shift to reward more innovative acquisition approaches. The acquisition workforce must become a cadre of professionals that are both empowered and accountable for maintaining the technological superiority of the U.S. Armed Forces.

SECTION 6: CONCLUSION

The complicated regulations, policies and procedures of the Defense acquisition system are often cited for the inability to respond quickly to changing Warfighter needs with timely and affordable solutions. However, rapid acquisition programs were able to overcome the limitations of regulations through waivers when capabilities were urgently needed by the Warfighter. The fragmented structure of the acquisition system was found to be the major contributor to the cost growth and schedule extension issues that hinder the development of major weapon systems.

The incompatibilities of the requirements, budgeting, and acquisition process generates a cycle of instability that negatively affects the entire system. Stakeholders operate these interdependent processes without appropriate consideration for the potential impact on the rest of the system. This engenders a stove-piped mentality where individual acquisition programs compete for funding and resources rather than collaborate to produce a better capability for the Warfighter.

The complexity of modern weapon systems and the current budget environment demands a collaborative multidisciplinary acquisition approach. The DOD should create a budget account specifically to fund technology maturation and transition within the S&T environment. Technology demonstration events must be held early and often to create synergy from direct interaction between the technology developer and the Warfighter. Integrated Acquisition Teams should be formed for major acquisitions to leverage the expertise of the technology developer, acquirer, and Warfighter expertise throughout the acquisition process. The disparate processes and stakeholders of the acquisitions system must be effectively integrated to transition advanced technology to warfighter on time and at cost. The consequences of failing to streamline the Defense acquisition system could be exceptionally detrimental to the United States' ability to maintain technological superiority in the modern security environment.

APPENDIX A

GLOSSARY[117]

Acquisition
The conceptualization, initiation, design, development, test, contracting, production, deployment, logistics support, modification, and disposal of weapons and other systems, supplies, or services (including construction) to satisfy DoD needs, intended for use in, or in support of, military missions.

Acquisition Category (ACAT)
Categories established to facilitate decentralized decision making and execution and compliance with statutorily imposed requirements. The categories determine the level of review, decision authority, and applicable procedures.

> ***ACAT I*** programs are Major Defense Acquisition Programs (MDAPs). An MDAP is a program estimated by the Under Secretary of Defense for Acquisition, Technology and Logistics (USD(AT&L)) to require eventual expenditure for research, development, test, and evaluation (RDT&E) of more than $365 million (Fiscal Year (FY) 2000 constant dollars) or procurement of more than $2.19 billion (FY 2000 constant dollars).

Acquisition Environment
Internal and external factors that impact on, and help shape, every Defense acquisition program. Often these factors work at opposite extremes and contradict each other. These factors include political forces, policies, regulations, reactions to unanticipated requirements, and emergencies.

Acquisition Life Cycle
The life of an acquisition program consists of phases, each preceded by a milestone or other decision point, during which a system goes through Research, Development, Test and Evaluation (RDT&E) and production. Currently, the five phases are: 1) Concept Refinement (CR); 2) Technology Development (TD); 3) System Development and Demonstration (SDD); 4) Production and Deployment (P&D); and 5) Operations and Support (O&S).

Acquisition Phase
All the tasks and activities needed to bring a program to the next major milestone occur during an acquisition phase. Phases provide a logical means of progressively translating broadly stated capabilities into well-defined, system-specific requirements and ultimately into operationally effective, suitable, and survivable systems.

Acquisition Process
The acquisition process that tells us "how to buy." It requires the program to balance cost, schedule and performance. It considers available technology versus performance, cost and the time-to-need. There are multiple career fields to provide expertise in this process. This creates fundamental disconnects in the big "A" acquisition with the budgeting and requirements processes and competing values and objectives.

Acquisition Program
A directed, funded effort that provides a new, improved, or continuing materiel, weapon, or information system or service capability in response to an approved need. Acquisition programs are divided into categories that are established to facilitate decentralized decision making, execution, and compliance with statutory requirements. (DoDD 5000.1)

Acquisition Streamlining
Any effort that results in a more efficient and effective use of resources to design, develop, or produce quality systems. This includes ensuring that only necessary and cost-effective requirements are included, at the most appropriate time in the acquisition cycle, in solicitations and resulting contracts for the design, development, and production of new systems, or for modifications to existing systems that involve redesign of systems or subsystems.

Acquisition System
Believed to be a simple construct; efficiently integrating the three interdependent processes of budget, acquisition and requirements

Act
1.) A bill or measure after it passes one or both Houses of Congress. 2.) A law in place.

Activity
A task or measurable amount of work to complete a job or part of a project.

Applied Research
Budget Activity (BA) 2 with a research, development, test, and evaluation (RDT&E) appropriation account. It translates promising basic research into solutions for broadly defined military needs and includes studies, investigations, and non-system specific technology efforts. It may also include design, development, and improvement of prototypes and new processes to meet general mission area requirements. Program elements funded under this BA typically involve pre-Milestone B efforts.

Appropriation
Statutory authority provided by an act of Congress that permits Federal agencies to incur obligations and make payments from the Treasury. An appropriation usually follows enactment of authorizing legislation. Appropriations do not represent cash actually set aside in the Treasury; they represent limitations of amounts that agencies may obligate during a specified time period. Appropriation types are listed below:

— **Research, Development, Test, and Evaluation (RDT&E)** appropriations fund the efforts performed by contractors and government activities required for the research and development (R&D) of equipment, material, computer application software, and its Test and Evaluation (T&E). RDT&E also funds the operation of dedicated R&D installation activities for the conduct of R&D programs.

— **Procurement** appropriations fund those acquisition programs that have been approved for production and all costs integral and necessary to deliver a useful end item intended for operational use or inventory upon delivery.

— **Operation and Maintenance (O&M)** appropriations fund expenses such as civilian salaries, travel, minor construction projects, operating military forces, training and education, depot maintenance, stock funds, and base operations support.
— **Military Personnel (MILPERS)** appropriations fund costs of salaries and other compensation for active and retired military personnel and reserve forces based on end strength.
— **Military Construction (MILCON)** appropriations fund major projects such as bases, schools, missile storage facilities, maintenance facilities, medical/dental clinics, libraries, and military family housing.

Appropriation Account
Subdivisions with an appropriation. For example, the research, development, test, and evaluation (RDT&E) appropriation funds several RDT&E accounts including Army RDT&E (2040A), Navy RDT&E (1319N), and Air Force RDT&E (3600F). There are also Defense-wide RDT&E accounts. The Army and Navy usually refer to their RDT&E appropriation accounts as "R&D money" while Air Force personnel usually refer to their RDT&E appropriation account by its numerical designator, that is, "3600 money."

Baseline
Defined quantity or quality used as starting point for subsequent efforts and progress measurement that can be a technical, cost, or schedule baseline.

Basic Research
Budget Activity (BA) 1 within a research, development, test, and evaluation (RDT&E) appropriation account that funds scientific study and experimentation directed toward increasing fundamental knowledge and understanding in those fields of the physical, engineering, environmental, and life sciences related to long-term national security needs. Program elements (PEs) funded under the BA typically involve pre-Milestone A efforts. (DoD 7000.14-R) See Research, Development, Test, and Evaluation (RDT&E) Budget Activities (BAs).

Budget
A comprehensive financial plan for the federal government encompassing the totality of federal receipts and outlays (expenditures). Budget documents routinely include the on budget and off budget amounts and combine them to derive a total of federal fiscal activity, with a focus on combined totals. Also a plan of operations for a fiscal period in terms of estimated costs, obligations, and expenditures; source of funds for financing, including anticipated reimbursements and other resources; and history and workload data for the projected program and activities.

Budget Activity (BA)
Categories within each appropriation and fund account that identify the purposes, projects, or types of activities financed by the appropriation or fund. See Research, Development, Test, and Evaluation (RDT&E) Budget Activities (BAs).

Budgeting
The process of translating resource requirements into a funding profile.

Buy American Act (BAA)
Provides that the U.S. government generally give preference to domestic end products. (Title 10 U.S.C. § 41 A D). This preference is accorded during the price evaluation process by applying punitive evaluation factors to most foreign products. Subsequently modified (relaxed) by Culver Nunn Amendment (1977) and other 1979 trade agreements for dealing with North Atlantic Treaty Organization (NATO) Allies.

Capability
The ability to achieve a desired effect under specified standards and conditions through combinations of ways and means to perform a set of tasks. It is defined by an operational user and expressed in broad operational terms.

Capability Gaps
The inability to achieve a desired effect under specified standards and conditions through combinations of means and ways to perform a set of tasks. The gaps may be the result of no existing capability, lack of proficiency or sufficiency in existing capability, or the need to recapitalize an existing capability.

Commercial Off-The-Shelf (COTS)
A commercial item (CI) sold in substantial quantities in the commercial marketplace and offered to the government under a contract or subcontract at any tier, without modification, in the same form in which it was sold in the marketplace. This definition does not include bulk cargo such as agricultural products or petroleum. (FAR, subpart 2.101)

Commitment
An administrative reservation of funds by the comptroller in anticipation of their obligation. Based upon firm procurement directives, orders, requisitions, authorizations to issue travel orders, or requests.

Competition
An acquisition strategy whereby more than one contractor is sought to bid on a service or function; the winner is selected on the basis of criteria established by the activity for which the work is to be performed. The law and DoD policy require maximum competition, to the extent possible, throughout the acquisition life cycle.

Cost Growth
A term related to the net change of an estimated or actual amount over a base figure previously established. The base must be relatable to a program, project, or contract and be clearly identified, including source, approval authority, specific items included, specific assumptions made, date, and the amount.

Decision Points
As defined and established by DoDI 5000.02, there are four decision points contained in the Defense Acquisition Management System (DAMS) of phases, milestones and decision points. The decision points are:

— **Materiel Development Decision (MDD)**: MDD review is the formal entry point into the acquisition process and is mandatory for all programs. A successful MDD may approve entry into the acquisition management system at any point consistent with phase-specific entrance criteria and statutory requirements but will normally be followed by a Materiel Solution Analysis (MSA) phase.

— **Post-Preliminary Design Review (PDR) Assessment**: Formal assessment of the results of the Preliminary Design Review (PDR), PDR Report, and program manager's (PM's) assessment by the Milestone Decision Authority (MDA) to determine whether remedial action is necessary to achieve Acquisition Program Baseline (APB) objectives. A Post-PDR Assessment is required if a PDR is not conducted prior to Milestone B. See Preliminary Design Review (PDR), Preliminary Design Review (PDR) Report, and Acquisition Program Baseline (APB).

— **Post-Critical Design Review (CDR) Assessment**: Formal review of the results of the CDR and Post-CDR Report submitted by the PM to the Milestone Decision Authority (MDA) that provides an overall assessment of design maturity and a summary of the system-level CDR results. Ends the Integrated System Design (ISD) effort and allows continuation of the Engineering and Manufacturing Development (EMD) phase into the System Capability and Manufacturing Process Demonstration effort. See Critical Design Review (CDR) and Critical Design Review (CDR) Report.

— **Full-Rate Production Decision Review (FRPDR)**: Conducted at the end of the Low-Rate Initial Production (LRIP) effort of the Production and Deployment (P&D) phase that authorizes Full-Rate Production (FRP) and approves deployment of the system to the field or fleet.

Defense Acquisition System
Management process by which DoD provides effective, affordable, and timely systems to the users. (DoDD 5000.1).

Deficiency
1.) Operational need minus existing and planned capability. The degree of inability to successfully accomplish one or more mission tasks or functions required to achieve mission or mission area objectives. Deficiencies might arise from changing mission objectives, opposing threat systems, changes in the environment, obsolescence, or depreciation in current military assets. 2.) In contract management, any part of a proposal that fails to satisfy the government's requirements.

Deploy/Deployment
Fielding a weapon system by placing it into operational use with units in the field/fleet.

Development
The process of working out and extending the theoretical, practical, and useful applications of a basic design, idea, or scientific discovery. Design, building, modification, or improvement of the prototype of a vehicle, engine, instrument, or the like as determined by the basic idea or concept. Includes all efforts directed toward programs being engineered for Service use but which have not yet been approved for procurement or operation, and all efforts directed toward development engineering and test of systems, support programs, vehicles, and weapons that have been approved for production and Service deployment.

DoD 5000 Series
Refers collectively to DoDD 5000.1 and DoDI 5000.2. See DoD Directive 5000.1 and DoD Instruction 5000.2.

DoD Directive (DoDD) 5000.1, The Defense Acquisition System
The principal DoD directive on acquisition, it states policies applicable to all DoD acquisition programs. These policies fall into five major categories: 1) Flexibility, 2) Responsiveness, 3) Innovation, 4) Discipline, and 5) Streamlined and Effective Management.

DoD Instruction (DoDI) 5000.2, Operation of the Defense Acquisition System
Establishes a simplified and flexible management framework for translating mission needs and technology opportunities, based on approved mission needs and requirements, into stable, affordable, and well-managed acquisition programs. Specifically authorizes the Program Manager
(PM) and the Milestone Decision Authority (MDA) to use discretion and business judgment to structure a tailored, responsive, and innovative program.

Effective Competition
A marketplace condition that results when two or more sources are acting (competing) independently of each other.

Enactment
Action by the Congress on the President's Budget. Includes hearings, budget resolution, authorizations, and appropriations acts. Result is appropriations (funding) for federal government.

Entrance Criteria
Minimum accomplishments required to be completed by each program prior to entry into the next phase or effort.

Environment, Operating
Used as an operational reference, environment includes the generic natural environment; e.g., weather, climate, ocean conditions, terrain, vegetation, electromagnetic, etc. Modified environment can refer to specific induced environments; e.g., "dirty" battlefield environment.

Execution
The operation of carrying out a program as contained in the approved budget. Often referred to as Budget Execution.

Exit Criteria
Program-specific accomplishments that must be satisfactorily demonstrated before a program can progress further in the current acquisition phase or transition to the next acquisition phase. Exit criteria are normally selected to track progress in important technical, schedule, or management risk areas. They serve as gates that, when successfully passed or exited, demonstrate that the program is on track to achieve its final program goals and should be allowed to continue with additional activities within an acquisition phase or be considered for continuation into the next acquisition phase.

Expired Account or Appropriation
Appropriation or fund account in which the balances no longer are available for incurring new obligations because the time period available for incurring such obligations has ended. However, the account remains available for 5 years to process disbursements, collections, and within scope adjustments of original obligations.

Export Administration Act (EAA)
The Department of Commerce manages an export control list to identify sensitive U.S. dual-use technologies.

Export Controls
Protect the cutting edge technologies for the Warfighter by imposing controls on end-use and end-users of critical technologies. The Department of Defense does not issue licenses, rather the role of the Department is to review and recommend licensing provisions to the Department's of State and Commerce.

Federal Acquisition Regulations (FAR)
The regulation for use by federal executive agencies for acquisition of supplies and services with appropriated funds.

Fielding
See Deploy/Deployment.

Goldwater-Nichols
Name given to the Defense Reorganization Act of 1986 that restructured certain aspects of DoD management. Named for co-authors Senator Barry Goldwater and Representative Bill Nichols.

Industry
The Defense industry (private sector contractors) includes large and small organizations providing goods and services to DoD. Their perspective is to represent interests of the owners or stockholders.

Initial Operational Capability (IOC)
In general, attained when some units and/or organizations in the force structure scheduled to receive a system 1) have received it and 2) have the ability to employ and maintain it.

Integrated Product Team (IPT)
Team composed of representatives from appropriate functional disciplines working together to build successful programs, identify and resolve issues, and make sound and timely recommendations to facilitate decision making.

Interoperability
The ability of systems, units, or forces to provide data, information, materiel, and services to and accept the same from other systems, units, or forces and to use the data, information, materiel, and services so exchanged to enable them to operate effectively together.

Joint Capabilities Integration and Development System (JCIDS)
There are three key processes in DoD that must work in concert to deliver the capabilities required by the Warfighter: the requirements process; the acquisition process; and the Planning, Programming, Budget, and Execution (PPBE) process. JCIDS implements the requirements process. JCIDS supports the Chairman of the Joint Chiefs of Staff (CJCS) and the Joint Requirements Oversight Council (JROC) in identifying, assessing, and prioritizing joint military capability needs as required by law. The capabilities are identified by analyzing what is required across all joint capability areas to accomplish the mission.

Joint Urgent Operational Need (JUON)
An urgent operational need identified by a combatant commander (CCDR) involved in an ongoing named operation. A JUON's main purpose is to identify and subsequently gain Joint Staff (JS) validation and resourcing for a solution, usually within days or weeks, to meet a specific high-priority need.

Major Defense Acquisition Program (MDAP)
An acquisition program that is designated by the Under Secretary of Defense for Acquisition, Technology and Logistics (USD(AT&L)) as an MDAP or estimated by the USD(AT&L) to require an eventual total expenditure for research, development, test, and evaluation (RDT&E) of more than $365 million in Fiscal Year (FY) 2000 constant dollars or, for procurement, of more than $2.19 billion in FY 2000 constant dollars.

Major System (DoD)
A combination of elements that shall function together to produce the capabilities required to fulfill a mission need, including hardware, equipment, software, or any combination thereof, but excluding construction or other improvements to real property. A system shall be considered a major system if it is estimated by the DoD component head to require an eventual total expenditure for research, development, test, and evaluation (RDT&E) of more than $140 million in Fiscal Year (FY) 2000 constant dollars, or for procurement of more than $660 million in FY 2000 constant dollars, or is designated as major by the DoD component head.

Market Research
A process for gathering data on product characteristics, suppliers' capabilities, and the business practices that surround them, plus the analysis of that data to make acquisition decisions.

Materiel Solution
Correction of a deficiency, satisfaction of a capability gap, or incorporation of new technology that results in the development, acquisition, procurement, or fielding of a new item (including ships, tanks, self-propelled weapons, aircraft, etc.) and related software, spares repair parts, and support equipment (but excluding real property, installations, and utilities) necessary to equip, operate, maintain, and support military activities without disruption as to their application for administrative or combat purposes.

Milestone (MS)
The point at which a recommendation is made and approval sought regarding starting or continuing an acquisition program, i.e., proceeding to the next phase.

Milestone Decision Authority (MDA)
Designated individual with overall responsibility for a program. The MDA shall have the authority to approve entry of an acquisition program into the next phase of the acquisition process and shall be accountable for cost, schedule, and performance reporting to higher authority, including congressional reporting. (DoDD 5000.01)

Militarily Useful Capability
A capability that achieves military objectives through operational effectiveness, suitability, and availability, which is interoperable with related systems and processes, transportable and sustainable when and where needed, and at costs known to be affordable over the long term.

Non-Materiel Solution
Changes in doctrine, organization, training, leadership and education, personnel or facilities, to satisfy identified functional capabilities.

Obsolescence
A lack of availability of an item or raw material resulting from statutory and process changes, as well as new designs. Obsolescence deals with the process or condition by which a piece of equipment becomes no longer useful, or a form and function no longer current or available for production or repair. Implementation of new technology causes older technology to become less supportable because of the diminished availability of parts and suppliers. Mitigation practices include reviewing proposed parts lists for obsolescence and being proactive in the engineering design process prior to production. (DoD 4140.1-R)

Off-The-Shelf
Procurement of existing systems or equipment without a research, development, test, and evaluation (RDT&E) program or with minor development necessary to make system suitable for DoD needs. May be commercial system/equipment or one already in DoD inventory.

Operational Requirements
User generated validated needs are developed to address mission area deficiencies, evolving threats, emerging technologies, or weapon system cost improvements. Operational requirements form the foundation for weapon system-unique specifications and contract requirements.

Planning, Programming, Budgeting and Execution (PPBE) Process
The primary Resource Allocation Process (RAP) of DoD. It is one of three major decision support systems for Defense acquisition along with Joint Capabilities Integration and Development System (JCIDS) and the Defense Acquisition System. It is a formal, systematic structure for making decisions on policy, strategy, and the development of forces and capabilities to accomplish anticipated missions. PPBE is a biennial process.

Procurement
Act of buying goods and services for the government.

Product
1.) The result of research, development, test, and evaluation (RDT&E) in terms of hardware or software being produced (manufactured). Also known as an end item. 2.) The item stipulated in a contract to be delivered under the contract (i.e., service, study, or hardware).

Program (Acquisition)
A defined effort funded by Research, Development, Test and Evaluation (RDT&E) and/or procurement appropriations with the express objective of providing a new or improved capability in response to a stated mission need or deficiency.

Program Management
The process whereby a single leader exercises centralized authority and responsibility for planning, organizing, staffing, controlling, and leading the combined efforts of participating/assigned civilian and military personnel and organizations, for the management of a specific Defense acquisition program or programs, throughout the system life cycle.

Program Manager (PM)
Designated individual with responsibility for and authority to accomplish program objectives for development, production, and sustainment to meet the user's operational needs. The PM shall be accountable for credible cost, schedule, and performance reporting to the Milestone Decision Authority (MDA). (DoDD 5000.1)

Program Instability
The condition imposed on a program as a result of problems and/or changes in requirements, technology, and funding.

Program of Record (POR)
Program as recorded in the current Future Years Defense Program (FYDP) or as updated from the last FYDP by approved program documentation.

Program Stability
A stable program is experiencing few, if any, perturbations in cost, schedule, performance, support, and other associated business or technical problems.

Relevant Environment
Testing environment that simulates key aspects of the operational environment.

Reliability
The ability of a system and its parts to perform its mission without failure, degradation, or demand on the support system under a prescribed set of conditions.

Requirements
The need or demand for personnel, equipment, facilities, other resources, or services, by specified quantities for specific periods of time or at a specified time. For use in budgeting, item requirements should be screened as to individual priority and approved in the light of total available budget resources.

Requirements Creep
The tendency of the user (or developer) to add to the original mission responsibilities and/or performance requirements for a system while it is still in development.

Research and Development Costs
Those program costs primarily associated with research and development efforts including the development of a new or improved capability, to the point where it is appropriate for operational use. These costs are funded under the Research, Development, Test and Evaluation appropriation.

Research, Development, Test, and Evaluation (RDT&E)
1.) Activities for the development of a new system or to expand the performance of fielded systems.
2.) An appropriation.

Research, Development, Test, and Evaluation (RDT&E) Budget Activities (BAs)
Consists of all efforts funded from an RDT&E appropriation account. Titles and definitions are used for budgeting purposes and managed by the Under Secretary of Defense (Comptroller) (USD(C)). There are seven RDT&E Budget Activities (BAs) as shown below:
— BA 1: Basic Research
— BA 2: Applied Research
— BA 3: Advanced Technology Development (ATD)
— BA 4: Advanced Component Development and Prototypes (ACD&P)
— BA 5: System Development and Demonstration (SDD)
— BA 6: RDT&E Management Support
— BA 7: Operational Systems Development

Risk
A measure of the inability to achieve program objectives within defined cost and schedule constraints. Risk is associated with all aspects of the program, e.g., threat, technology, design processes, or Work Breakdown Structure (WBS) elements. It has two components: the probability of failing to achieve a particular outcome, and the consequences of failing to achieve that outcome.

Schedule Risk
The risk that a program will not meet its acquisition strategy schedule objectives or major milestones established by the acquisition authority.

Science and Technology (S&T) Program
Consists of projects funded by the Research, Development, Test, and Evaluation (RDT&E) Budget Activities (BAs) of basic research, applied research, and Advanced Technology Development (ATD).

Supplemental Appropriation
An act appropriating funds in addition to those in an annual appropriation act. Supplemental appropriations provide additional budget authority (BA) beyond original estimates for programs or activities (including new programs authorized after the date of the original appropriation act) for which the need for funds is too urgent to be postponed until enactment of the next regular appropriation act.

Sustainability
The ability to maintain the necessary level and duration of operational activity to achieve military objectives. Sustainability is a function of providing for and maintaining those levels of ready forces, materiel, and consumables necessary to support military effort. (*JCIDS Manual*)

Sustainment
The provision of personnel, training, logistics, and other support required to maintain and prolong operations or combat until successful accomplishment or revision of the mission or of the national objective.

System of Systems (SoS)
A set or arrangement that results when independent and useful systems are integrated into a larger system that delivers unique capabilities.

Technical Risk
The risk that arises from activities related to technology, design and engineering, manufacturing, and the critical technical processes of test, production, and logistics.

Technology Readiness Level (TRL)
One level on a scale of one to nine, e.g., "TRL 3," signifying technology readiness pioneered by the National Aeronautics and Space Administration (NASA), adapted by the Air Force Research Laboratory (AFRL), and adopted by the Department of Defense as a method of estimating technology maturity during the acquisition process. The lower the level of the technology at the time it is included in a product development program, the higher the risk that it will cause problems in subsequent product development.

Technology Transition
Process of inserting critical technology into military systems to provide an effective weapons and support system in the quantity and quality needed by the Warfighter to carry out assigned missions.

Test and Evaluation (T&E)
Process by which a system or components are exercised and results analyzed to provide performance-related information. The information has many uses including risk identification and risk mitigation and empirical data to validate models and simulations. T&E enables an assessment of the attainment of technical performance, specifications, and system maturity to determine whether systems are operationally effective, suitable and survivable for intended use, and/or lethal.

Under Secretary of Defense (Acquisition, Technology and Logistics) (USD(AT&L))
The USD(AT&L) has policy and procedural authority for the Defense Acquisition System, is the principal acquisition official of the Department, and is the acquisition advisor to the Secretary of Defense (SECDEF). In this capacity the USD(AT&L) serves as the Defense Acquisition Executive (DAE), the Defense Senior Procurement Executive, and the National Armaments Director — the last regarding matters of the North Atlantic Treaty Organization (NATO).
For acquisition matters, the USD(AT&L) takes precedence over the Secretaries of the Services after the SECDEF and Deputy SECDEF. The USD(AT&L) authority ranges from directing the Services and Defense agencies on acquisition matters, to establishing the Defense Federal Acquisition Regulation Supplement (DFARS), and chairing the Defense Acquisition Board.

User
An operational command or agency that receives or will receive benefit from the acquired system. Combatant Commanders (COCOMs) and their Service Component commands are the users. There may be more than one user for a system. Because the Service Components are required to organize, equip, and train forces for the COCOMs, they are seen as users for systems. The Chiefs of Services and heads of other DoD Components are validation and approval authorities and are not viewed as users.

Weapon System
Items that can be used directly by the Armed Forces to carry out combat missions.

APPENDIX B
LIST OF ACRONYMS[118]

ACAT	Acquisition Category
AVD	Acquisition Valley of Death
DAS	Defense Acquisition System
DOD	Department of Defense
DFARS	Defense Federal Acquisition Regulation
FAR	Federal Acquisition Regulation
GAO	Government Accountability Office
GWOT	Global War on Terror
JCIDS	Joint Capabilities Integration and Development System
JIEDDO	Joint Improvised Explosive Device Defeat Organization
JLTV	Joint Light Tactical Vehicle
JUONS	Joint Urgent Operational Needs
IED	Improvised Explosive Device
IMPROVE	Implementing Management for Performance and Related Reforms to Obtain Value in Every Acquisition
ISR	Intelligence, Surveillance, and Reconnaissance
MDA	Every
MDAP	Major Defense Acquisition Program
MRAP	Mine-Resistant, Ambush-Protected Vehicles
PM	Program Manager
POR	Program of Record
PPBE	Planning, Programming, Budgeting and Execution Process
QRC	Quick Reaction Capability
S&T	Science and Technology
T&E	Test and Evaluation
TRL	Technology Readiness Level
R&D	Research and Development
RDT&E	Research, Development, Test and Evaluation
SECDEF	Secretary of Defense
UAS	Unmanned Aircraft System

END NOTES

(All notes appear in shortened form. For full details, see the appropriate entry in the bibliography).

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